

AMENDED CLAIMS

221

422 Rec'd PCT/PTO 19 OCT 2000

3/parts.

New Claims

Sub B2
5 1. A circuit arrangement for the dynamic control of piezo-translators (2) with energy recovery by means of a single inductive intermediate store (1) which is arranged in series with the piezotranslators (2) as well as by clocked switches, wherein characterised in that

10 for achieving a predetermined linear voltage characteristic at the piezotranslator (2), the secondary circuit is designed as a half-bridge consisting of the switches (3, 4) at whose output the inductive intermediate store (1) is arranged in series with the piezotranslator (2), with the switches (3, 4) being externally controlled and operated at a high cycle or switching frequency in such a manner that the intermediate store is alternately connected with an upper or lower supply voltage ((UB/2) at the most, with the series connection of piezotranslator (2) and inductive intermediate store (1) carrying a superimposed bridge direct current.

15 2. The circuit arrangement according to Claim 1, wherein characterised in that

20 the switches (3, 4) are formed as MOS transistors (9), with an external diode (10) being connected in series with the clearance between contacts, and this series connection being bridged by a commutating diode (11) which is oppositely poled to the diode (10).

25 3. The circuit arrangement according to one of the previous claims, wherein characterised in that

30 a current sensor (12) for generating a control voltage which is proportional to the output current of the final stage (18) is arranged in the secondary circuit of the piezotranslator

B2
(cont)

5 (2) for controlling the arrangement, with the control voltage being connected with a first input of a first controller (13), the second input of the first controller (13) being applied at the output of the second controller (14), at whose two inputs a predetermined reference variable according to the physical position of the piezotranslator (2) and an actual value which is proportional to the output voltage of the final stage (18) are applied.

10 4. The circuit arrangement according to Claim 3,
~~wherein~~
~~characterised in that~~

15 a third controller (19) is provided for the positioning control, at whose first input the reference variable of the physical position of the piezotranslator (2) and at whose second input a mechanical actual value which is detected via a sensor (20) of the piezotranslator (2) are applied, with the output of the third controller (19) being connected with one of the inputs of the second controller (14).

20 5. The circuit arrangement according to Claim 3,
~~wherein~~
~~characterised in that~~

1 the second controller (14) feeds back the integral of the piezotranslator current in lieu of a voltage which is proportional to the output voltage of the final stage (18).

25

Add B1

Claims

1. A circuit arrangement for the dynamic control of ceramic solid-state actuators, such as piezotranslators with energy recovery by means of magnetic intermediate stores and/or storage capacitors as well as by clocked switches,
5 characterised in that

for achieving a predetermined linear voltage characteristic at the piezotranslator (2), a single inductive intermediate store (1) is arranged in the secondary circuit, which is connected in series with the piezotranslator (2) and the secondary circuit is designed as a half-bridge, with the switches (3, 4) provided in the respective half-bridge being externally controlled and operated at a high cycle or switching frequency,
10 and with the series connection of piezotranslator (2) and inductive intermediate store (1) furthermore carrying a superimposed bridge direct current.
15

2. The circuit arrangement according to Claim 1,
20 characterised in that
the switches (3, 4) are formed as MOS transistors (9), with an external blocking diode (10) being connected in series with
25 the clearance between contacts, and this series connection being bridged by a commutating diode (11) which is oppositely poled to the blocking diode (10).

3. The circuit arrangement according to Claim 1 or 2,
30 characterised in that,
under installation aspects, the intermediate store (1) is arranged close to the piezotranslator (2).

4. The circuit arrangement according to one of the previous claims,
35 characterised in that

a current sensor (12) for determining a control voltage which
is proportional to the output current of the final stage (18)
is arranged in the secondary circuit of the piezotranslator
5 (2) for controlling the arrangement, with the control voltage
being connected with a first input of a first controller (13),
the second input of the first controller (13) being applied at
the output of the second controller (14), at whose two inputs
10 a predetermined reference variable according to the physical
position of the piezotranslator (2) and an actual value which
is proportional to the output voltage of the final stage (18)
are applied.

5. The circuit arrangement according to Claim 4,
characterised in that
15 a third controller (19) is provided for the positioning con-
trol, at whose first input the reference variable of the
physical position of the piezotranslator (2) and at whose
second input a mechanical actual value which is detected via a
sensor (20) of the piezotranslator (2) are applied, with the
20 output of the third controller (19) being connected with one
of the inputs of the second controller (14).

6. The circuit arrangement according to Claim 4,
characterised in that
25 the second controller (14) feeds back the integral of the
piezotranslator current in lieu of a voltage which is pro-
portional to the output voltage of the final stage (18) in
order to improve the dynamic behaviour of the control.